

WE CLAIM:

1. A method of visually documenting historical changes in biological tissue, comprising the steps of:

(a) obtaining a first image of a region of tissue;
(b) after obtaining said first image, obtaining a second image of said region of tissue;

(c) digitally storing said first and second images as digitized first and second images;

(d) spatially adjusting at least one of said first and second digitized images to spatially register said images so that corresponding features in both images are mapped to corresponding positions; and

(e) creating from said first and second digitized images a derived image which visually emphasizes differences between said first and second images, thereby visually emphasizing historical changes between said images.

2. The method of claim 1, wherein said step of spatially adjusting at least one of said first and second digitized images comprises:

determining a coordinate transformation which produces at least a pre-determined degree of correlation between said first and second digitized images; and

applying said coordinate transformation to at least one of said first and second digitized images, to align said images.

3. The method of claim 2, wherein said coordinate transformation is determined by:

(a) applying a plurality of coordinate transformations to one of said first and second digitized images, to obtain a plurality of corresponding adjusted images;

(b) cross-correlating said adjusted images with one of said first and second digitized images, to produce a correlation output; and

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(c) selecting a coordinate transformation which produces at least a defined correlation output from its corresponding adjusted image.

4. The method of claim 3, wherein said step of cross-correlating comprises:

inputting said first and second images to an optical correlator, and

reading said correlation output from an output of said optical correlator.

5. The method of claim 2, further comprising the step of recording said derived image for archiving.

6. The method of claim 5, wherein said step of recording comprises storing said composite image on a computer readable medium.

7. The method of claim 5, wherein said step of recording comprises printing an image based upon said composite image.

8. The method of claim 2, wherein at least one of said first and second images is a three-dimensional image.

9. The method of claim 1, wherein said step of creating a composite image comprises:

comparing an image intensity at a location in said first image with a respective intensity at a corresponding location in said second image, and

determining a difference image value based upon the difference between said image intensity at said location in said first image and the respective intensity at said corresponding location in said second image.

10. The method of claim 1, wherein said composite image visually emphasizes image differences by representing various regions of said composite image in synthetic colors, based upon image differences between the first and second images.

11. A method of creating a displayable composite mammographic image from a plurality of raw mammographic images, corresponding to earlier and later mammographic images, comprising the steps of:

- (a) obtaining the earlier image of a region of tissue;
- (b) obtaining the later image of substantially the same region of tissue;
- (c) deriving a difference image which represents changes between said earlier and later images; and
- (d) combining at least one of said earlier and later images with said difference image, to produce a composite image.

12. The method of claim 11, further comprising the step of recording said composite image for archiving.

13. The method of claim 12, wherein said step of recording comprises storing said composite image on a computer readable medium.

14. The method of claim 12, wherein said step of recording comprises printing an image based upon said composite image.

15. The method of claim 11, wherein at least one of said earlier and later images is a three dimensional image model.

16. The method of claim 11, wherein said step of creating a composite image comprises:

spatially adjusting at least one of said earlier and later images to aid in registering said images.

17. The method of claim 16, wherein said step of spatially adjusting at least one of said earlier and later images comprises:

determining a coordinate transformation which produces a desired degree of correlation between said earlier and later images; and

applying said coordinate transformation to at least one of said earlier and later images, to align said images.

18. The method of claim 17, wherein said coordinate transformation is determined by:

(a) applying a plurality of coordinate transformations to one of said earlier and later images, to obtain a plurality of corresponding adjusted images;

(b) cross-correlating said adjusted images with one of said earlier and later images, to produce a correlation output; and

(c) selecting a coordinate transformation which produces a defined correlation output from its corresponding adjusted image.

19. A system for enhancing imagery of bodily tissues by relating earlier and later images, comprising:

an image processor, programmed to: (a) receive said earlier and later images, (b) register the earlier and later images by controlling an optical correlator to find a position of correlation between said earlier and later images, and (c) derive a composite image from the earlier and later images; and

an optical correlator coupled to said image processor and arranged to correlate said earlier and later images, and to output to said image processor a cross correlation image which is indicative of the position of correlation of the processed images.

21. The system of claim 19, further comprising a visual display, coupled to said image processor and receiving from said image processor said composite image, to permit a user to view said composite image.

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